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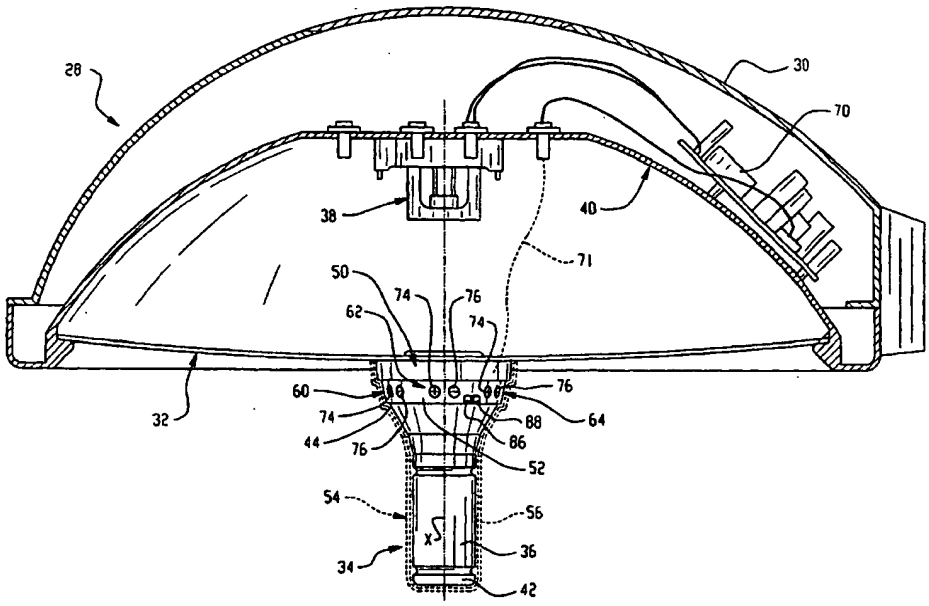

(57) Abstract: A lighting system (10) suited to use in an operating theater includes one or more lightheads, each having a housing (28) and a bezel (50) extending therefrom. A light source (38) is disposed within the housing. A handle (36) extends below the bezel and is rotatable relative thereto. A lighting control input means (60), associated with the bezel allows adjustment of the intensity of light emitted by the light source. A sterile cover (54) can be placed over both the handle and the bevel, allowing the input means to be manipulated by pressure on the cover with the thumb of the operator's hand, while simultaneously grasping the handle in the palm and fingers.

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ERGONOMIC CONTROLS IN A SURGICAL LIGHTING SYSTEM

Background of the Invention

The present invention relates to the surgical lighting and accessory control arts. It finds particular application in conjunction with controlling the intensity of light emanating from lightheads in an operating room (OR) setting and will be described with particular reference thereto. It is to be appreciated, however, that the invention also finds application in conjunction with controlling functions of other devices and is not limited to the aforementioned lighting application.

Typically, in an operating room setting, large, high lumen output lightheads are used to illuminate the surgical site. At certain times during an operation, it is appropriate for the surgeon to adjust the intensity of the light. For example, the surgeon may prefer a more intense overhead light to illuminate the operating region better, or the surgeon may desire to decrease the strength of the overhead light to reduce the effects of shadows or glare. In some situations, the overhead lamps are turned off completely so that smaller, local light sources can be used or to help surgeons view monitor screens and other equipment.

Light intensity controls in typical lighting systems are generally located in areas which are not directly accessible to the surgeon, such as on a non-sterile wall plate. To avoid potential contamination of the operating site, the surgeon requests a circulating nurse to adjust the non-sterile controls, as needed. This consumes both the nurse's time, and the surgeon's attention.

U.S. Patent No. 6,402,351 discloses a lighting system in which the light intensity control is located on a distal end of a sterile handle of the lighthead. A single push button at the tip of the lighthead handle is used to allow the surgeon to control the intensity, cycling through discrete intensity levels with each push of the button. A primary disadvantage of this system, however, is that it is very awkward to use. The hand must be inverted in order to position the user's thumb under the push button on the bottom of the lighthead handle. Additionally, the push-button mechanism creates surfaces where blood can become lodged, making sterilization for subsequent procedures difficult. Still further, functionally, the single push button allows only unidirectional light level cycling.

The present invention provides new and improved ergonomic control methods and apparatus that overcome the above-referenced problems and others.

Summary of the Invention

According to one aspect of the invention, a lighting system is provided. The lighting system includes a lighthead including a housing, a light source disposed within the housing, a handle carried by the housing, adapted for grasping for moving the housing to selected positions, and a bezel. The handle is at least partially spaced from the housing by the bezel. An actuator on the bezel selectively adjusts an intensity of light emitted by the light source.

In accordance with another aspect of the present invention, a method of adjusting illumination from a lighthead is provided. The method includes covering a handle of a lighthead with a sterile cover and manipulating the handle to adjust a pattern size of illuminated light from a housing of the lighthead on a subject. The method further includes manipulating an actuator through the sterile cover to adjust an intensity

of the illuminated light. The actuator is spaced from the handle such that the handle is removable from the housing without removing the actuator.

In accordance with another aspect of the present invention, a lighting system including a lighthead is provided. The lighthead includes a housing. A light source is disposed within the housing. A bezel extends from the housing. A handle is rotatable relative to the housing and is at least partially spaced from the housing by the bezel. An actuator is associated with the bezel for adjusting an intensity of light emitted by the light source.

In accordance with another aspect of the present invention, a surgical light apparatus is provided. The light apparatus includes a housing. A light source is located within the housing. A handle is carried by the housing for selectively focusing light from the light source. An actuator selectively adjusts an intensity of light emitted by the light source. The actuator is spaced from the handle such that the handle is removable from the housing without removing the actuator. A cover is selectively mountable on the handle such that the cover covers the actuator, whereby the actuator is operable by applying pressure on the cover adjacent the actuator.

In accordance with another aspect of the present invention, a surgical light apparatus of the type including a lighthead housing, a bulb located within the housing, a lens, a handle adjacent the lens, a bezel area between the handle and the lens, and a controller coupled to the bulb is provided. An ergonomic control apparatus includes at least one actuator on the bezel area for controlling a function effected by the controller.

One advantage of at least one embodiment of the present invention is the provision of an easily accessible light intensity control.

Another advantage of at least one embodiment of the present invention is that the intensity control switches are located on the bezel area of a surgical lighthead.

Another advantage of at least one embodiment of the present invention is that the handle is removable from the bezel without the need for disconnecting mechanical or electrical connections between the intensity control switches and the light source.

Still further advantages and benefits of the present invention will become apparent to those of ordinary skill in the art upon reading the following detailed description of the preferred embodiment.

Brief Description of the Drawings

The invention may take form in various components and arrangements of components, and in various steps and arrangements of steps. The drawings are only for the purpose of illustrating preferred embodiments and are not to be construed as limiting the invention.

FIGURE 1 is a perspective view of a lighting system including a pair of lightheads connected to a suspension system in accordance with an embodiment of the invention;

FIGURE 2 is a side view, in partial section of one of the lightheads of FIGURE 1;

FIGURE 3 is an exploded perspective view of the lighthead of FIGURE 2;

FIGURE 4 is an enlarged perspective view of the bezel and bezel membrane of FIGURE 3;

FIGURE 5 is a perspective view of the sterile cover of FIGURE 2;

FIGURE 6 is an enlarged perspective view of the handle and bezel of an alternative embodiment of a lighthead according to the present invention;

FIGURE 7 is a schematic view of a lighting system and master control unit according to another embodiment of the invention;

FIGURE 8 is an enlarged view of the control panel of FIGURE 7;and

FIGURE 9 is a side sectional view of the bezel and handle mounted to a gearbox of the lighthead of FIGURE 1.

Detailed Description of the Preferred Embodiments

With reference to **FIGURE 1**, an overhead lighting system **10** suited to use in an operating room illuminates areas of a patient **12** undergoing surgery. The system **10** illustrated in **FIGURE 1** includes two lightheads **14, 16**, which are suspended from a common mounting system **18** by articulated arm assemblies **20, 22**, respectively. The arm assemblies allow the lightheads to be independently movable to a variety of positions relative to a ceiling **24** and the patient. The lighting system **10** is rigidly mounted to a suitable stationary support, such as a beam (not shown), typically located above the ceiling. As will be appreciated, the lighting system **10** may also include other medical devices, such as task lights, monitors, cameras, and the like (not shown).

Each lighthead **14, 16** includes a housing **28** including a dome-shaped cover or shell **30**, a lens system **32**, through which the light shines from the respective lighthead, and a handle assembly **34**, shown in detail in **FIGURES 2** and **3**. To maneuver a lighthead to a suitable location, a surgeon grasps a handle **36** of the handle assembly **34** and pulls the lighthead to the desired position. The housing shell **30** and lens system **32** together enclose a light source **38**, such as one or more light bulbs or fiberoptic member. A reflector **40** directs the light from the light source **38** through the lens system **32**. In one embodiment, the lens system **32** includes two or more lenses, which are moved relative to

each other, to adjust the focus of the light on the patient, *e.g.*, by decreasing or increasing the diameter of the light pattern on the patient. While the description refers to lighthead **14**, shown in **FIGURE 2**, it will be appreciated that the description applies as well to lighthead **16**.

The handle **36** is in the form of a generally cylindrical hollow shaft, which may be widened or otherwise shaped at its closed distal end **42** for ease of handling. The upper or proximal end of the handle widens to form a lip **44**. A bezel or escutcheon **50** is mounted to or other formed on the lighthead housing **28** such that it is located intermediate the housing and the handle **36**. For example, the bezel is mounted to the lighthead by bolts, screws, adhesive, or other suitable fixing means **51**. In the illustrated embodiment, four screws **51** are used to attach the bezel to the lighthead, as will be described in greater detail below.

The bezel **50** includes a frustoconically shaped distal end **52**, which is adjacent to or in contact with the lip **44** of the handle **36**. The handle **36** is rotatable, relative to the bezel **50**, about an axis **X** through the lighthead, to adjust the focus of the lamp **38**. The beam pattern emanating from the lighthead is thus adjusted by twisting the handle **36**. By rotating the handle **36**, the pattern size of the illuminated light on the patient can be increased or decreased. The handle **36** can be rotatably mounted to the lighthead via a suitably positioned central opening **53** in the bezel **50**, best shown in **FIGURE 4**, and described in further detail below.

A disposable sterile cover **54** (shown in phantom in **FIGURE 2** and in perspective view in **FIGURE 5**) surrounds both the handle **36** and the bezel **50**. Gripping regions **55** of the cover cooperate with corresponding regions (not shown) on the handle **36**, to inhibit the cover from falling off the handle and to resist relative rotational movement between the cover and the handle,

when the surgeon desires to twist the handle. The cover **54** has a sterile or highly disinfected outer surface **56** which the surgeon can handle repeatedly without risk of contaminating the surgeon's hands. When the surgeon grasps and rotates the handle **36**, the cover **54** rotates along with the handle. The cover includes a generally cylindrical base portion **57**, which covers the base **42**, and sides of the handle **36**, and a widened upper portion **58**, which covers the widened upper portion **44** of the handle and the bezel **50**.

Lighting control input means **60**, such as a plurality of membrane switches, are located on the bezel **50** of the lighthead handle assembly and serve as an actuator for the light source **38**. The control input switches **60** are positioned to enable the surgeon to operate the switches while maintaining sterile technique by depressing the switches through the disposable cover **54**. Specifically, at least the upper portion **58** of the cover is sufficiently flexible or movable such that pressure on the cover adjacent the switches **60** allows the operation of the switches beneath. The cover is preferably formed from a transparent material so that the locations of the switches are readily visible therethrough.

The switches **60** are used to control the intensity of the light emanating from the lighthead. When the surgeon loosely grips the handle with the palm and fingers of the hand, the thumb is suitably positioned to depress the switches on the bezel above the handle. The relative position between the switches and the handle has ergonomic advantages and makes the switches extremely easy to operate and convenient to use.

As shown in **FIGURE 2**, several sets **60, 62, 64** of the switches (four sets in a preferred embodiment) are circumferentially spaced around the bezel **50** so that a set of switches is readily accessed irrespective of the rotational position of the surgeon's hand. Additionally,

a transparent flexible annular membrane **66**, formed from plastic or rubber, covers all of the switches **60** to provide an outer surface **68** which is easy to keep clean but which is sufficiently flexible to allow the switches to be actuated therethrough.

In one embodiment, the switches **60** are in the form of push buttons operable for an incremental increase or decrease in the light intensity with each successive depression of the button. The push buttons are operatively connected with a suitable controller **70**, for example, by suitable electrical wiring **71**. The controller is adapted to receive inputs from the buttons and react to those inputs to regulate the power supplied to the respective light source **38** of the lighthead to adjust the light intensity. The controller **70** may be located within the housing **28**, such as between the reflector **40** and the dome **30**, as illustrated in **FIGURE 3**, or located elsewhere, such as in the bezel **50**, or spaced from the lighthead **14, 16** and electrically connected thereto.

In the embodiment of **FIGURE 2**, each set of switches **60, 62, 64** includes a first push button **72**, which, when depressed, causes an increase in the light intensity between a low intensity and a maximum intensity. When the light emanating from the lighthead is at its maximum intensity available, the controller **70** maintains the setting so that further pressing the increase intensity button **72** has no effect.

A second push button **76** in each set **60, 62, 62** is a decrease intensity button, which when actuated, causes the light emanating from the light source **38** of the lighthead to decrease in intensity when depressed. When the lighthead reaches its lowest intensity setting (a low level light), lightly depressing the decrease intensity button **76** has no effect. However, if the button **76** is held in the depressed state for a predetermined period of time, such as about 1-2 seconds,

the light source **38** is switched off. Preferably, the controller **70** actuates an ambient light **80**, contemporaneously with switching off the lighthead **14**. The ambient light is spaced from the lighthead **14**, **16** and provides overall low level room illumination.

FIGURE 1 shows the ambient light **80** associatively coupled with the mounting system **18**, although other locations for the ambient light are also contemplated. In one embodiment, switching one of the lightheads **14** to off by the selectable lengthy time depression also switches off the other lighthead **16**, regardless of its current intensity setting. Other arrangements are contemplated. For example, sustained holding of the decrease button **76** for a first time period, e.g., one (1) second, switches off just the associated lighthead **14**, while depression for an additional selectable time period, e.g., two to four (2-4) seconds, turns off all of the lightheads associated with the controller **70** and turns on the overhead ambient light **80**. The selectable delay interval time periods and other system parameters are preferably programmed into the controller software and are adjustable by changing or modifying the software. Alternatively, the time intervals are selectable from an input device associated with the controller **70**.

The buttons **74**, **76** are suitably marked as desired with a visual indicator **81**, such as a plus (+) or minus (-) symbol, as shown in **FIGURE 2** to denote their function. Preferably, the buttons are molded with raised indicators to provide for ready tactile recognition when the lighting level is low. The tactile differences also assist the surgeon in distinguishing the buttons when attention is focused elsewhere. Alternatively or additionally, as shown in **FIGURE 6**, the two buttons **74**, **76** are shaped differently (oppositely pointing triangles in the illustrated embodiment), to facilitate identification by touch. Each of the buttons **74**, **76** has

a raised indicator **81** (v for decreasing intensity, ^ for increasing intensity in the illustrated embodiment).

Optionally, a separate power switch **82** is provided for switching the light source **38** on or off at any time. The power switch **82** is optionally mounted on the bezel **50**, adjacent the switches **74, 76**, as shown in **FIGURE 6**. There may be more than one power switch **82**, as for the other switches **74, 76**. The power switch **82** is preferably readily distinguished, both visually and in by touch, from the other switches. In the illustrated embodiment it is different in color (e.g., red, blue, or green) from the switches **74, 76** and has a different shape--round, rather than triangular. A raised power symbol portion **84** is included in the center, for visual and tactile distinction. In one embodiment, the power button **82** acts as a toggle switch. If it is depressed when the lighthead **14** is on, it turns the lighthead off. If it is depressed when the lighthead **14** is off, it turns the lighthead on. In the illustrated embodiment, the power button **82** has the ability to control other lightheads **16** and/or other equipment as well. If the lightheads are on, and the power button **82** is depressed and held in a depressed condition for an extended period, then all the lightheads **14, 16** are turned off by the associated controller **70**. If the lightheads **14, 16** are off, and the power button **82** is depressed and held, all the lightheads are turned on. For example, all the lightheads are toggled if a power button is held for two (2) seconds. The time period for the function delay can be adjusted as desired.

The controller **70** is adapted to receive input signals from the buttons **74, 76, 80** and respond to those signals to regulate the power to the respective lighthead light source to effect the desired operational function. In one embodiment, additional control means, such as push buttons **86, 88** are provided and are similarly connected to the controller to control devices and apparatus other

than the associated lighthead such as, for example, video, audio, and other equipment.

The physical location of the switches **74, 76, 82** on the bezel **50** has several advantages. First, it allows the switches to be covered by the thin flexible upper portion **58** of the disposable sterile cover **54** and thus remain outside the sterile field to enable activation of the switches without direct sterilization. Second, it permits a mechanical separation between the handle and the lighthead to allow the handle **36** to be readily removable from the bezel **50**. Placing all the electrical connections within the bezel region allows them to remain with the lighthead **14** when the handle removed for sterilization. The handle can thus be subjected to repeated high-level sterilization processes without posing risk of damage to electrical components. Third, placement of switches on the bezel is an ergonomically beneficial arrangement on a surgical lighthead which allows for ease of operation. The handle **36** can be loosely grasped while the switches **74, 76, 82** are comfortably activated using the natural motion of the upwardly extended thumb.

The location of the buttons **74, 76, 84** on the bezel **50** allows the entire handle **36** and bezel **50** to be covered by a single disposable sterile cover **54**. The preferred cover **54** is thin and easily slides over the handle **36**, covering the entirety of the exposed portions of the bezel **50**. This allows the surgeon to have immediate access to the lighting controls through the sterile cover while maintaining a sterile operating field. The cover, being disposable, is simply discarded after a surgery. The sterile cover **54** provides an interface between the sterile field on one side of the cover and non-sterile items on the non-sterile bezel **50**. The bezel controller **70** is preferably separate from and not part of the removable lighthead handle **36** and need not be sterile.

With reference also to **FIGURES 7** and **8**, a master control unit **90** is in communication with each of the lightheads **14, 16**. The master control unit **90** may be mounted on a wall of the operating theater or at any other convenient location and includes a control panel **92**, shown in greater detail in **FIGURE 8**, for independently controlling each of the lightheads and other components of the system **10**. The control panel includes a display screen **94** and a series of manually operable switches by which the lightheads and other components can be controlled. For example "select light" switches **96** and **98** allow an operator to toggle through the various lightheads (numbered 1-4 on the display panel) and select one of the lightheads. The operator can then use the intensity switches **100, 102** to vary the intensity of the light output on the selected lighthead. The intensity switches **100, 102** may be toggle switches which operate in a similar manner to intensity buttons **74, 76**, sending signals to the controller **70**. Either one of the switches of the master control unit **90** and the switches of the lighting control input means **60** can override the instructions of the other by being the latest in time to send a signal. A series of illuminated LED bars **104** associated with each lighthead on the display screen **94** provides an indication of the intensity of the light between zero (no bars illuminated 2), as in the case of lighthead No. 2, and maximum intensity (seven bars), as in the case of lighthead No. 1, in the illustrated embodiment. A function **106** labeled "all lights" allows all of the lightheads **14, 16** to be set to the same setting.

As shown in **FIGURE 8**, communication cables **110, 112** extend between the master control **90** and the controller **70** in each lighthead for carrying signals therebetween. For example, when the controller **70** of one lighthead **14** receives a signal from the switch **76** to switch off the bulb **38** and also that of the other

lighthead **16**, the controller sends a signal to the master control unit **90**, which in turn signals the controller of the lighthead **16** to switch off the bulb of that lighthead. The master control unit **90** also signals the ambient light **80** to switch on. These operations are carried out simultaneously or substantially so such that the operating room is not plunged in darkness for any significant length of time.

By way of example, **FIGURES 7** and **8** illustrate the subject ergonomic controls in a system **10** in which lightheads **14, 16** are mounted to a common hub **120** of the support system **18**. A task light **122** and a lighthead **124** with a camera attachment **126** are also mounted to the common hub **120** by arm assemblies **128, 130**. It will be appreciated that these and a variety of other components may all be controlled from the master control unit **90** as well as having separate, independent controllers associated with each component **14, 16, 122, 124**.

With reference now to **FIGURE 9**, and reference also to **FIGURES 3** and **4**, the bezel **50** and handle **36** are assembled on the lighthead, preferably as follows. The lighthead is fitted with a gearbox **140**, which extends below the lens **32**. A handle subassembly **144** is mounted to the gearbox **140**. Specifically, threads **146** on the handle subassembly engage corresponding threads **148** on the gearbox **140**. The bezel **50**, with the membrane **66** attached, is mounted to a stationary housing **150** of the gearbox **140** using the screws **51** or other suitable fixing members. Keyhole slots **152** are formed on an inwardly extending rim **154** of the distal end **52** of the bezel, adjacent the opening **53**, best shown in **FIGURE 4**. The slots **152** receive the screws **51** therethrough.

The wiring **71** from the bezel actuators **60** is connected with the controller **70**. The handle subassembly **144** extends through the opening **53** in the bezel and is exteriorly threaded at **156**. The handle **36** is interiorly threaded with corresponding threads at **158** which

threadably engage the threads **156** as the handle is mounted on the handle subassembly **144**. The lip **44** at the upper end of the handle covers the heads of the screws **51** and is seated against the distal end **52** of the bezel. Finally, the sterile cover **54** is pushed on to the handle **36** and bezel **50**. The handle **36** can be readily removed from the handle subassembly **144**, for sterilization, by rotating the handle to disengage the threads **158** from the subassembly threads **156**.

When the surgeon grasps and turns the handle **36**, the handle and subassembly **144** rotate, conveying the rotation to the gearbox **140**, which, in turn, adjusts the focus of the light from the lamp **38** on the patient. This adjustment may be achieved by adjusting the position of the lamp **38** relative to the reflector **40** or by adjusting the focusing of the lens system **32**.

Having thus described the preferred embodiments, the invention is now claimed to be:

1. A lighting system (10) comprising a lighthead (14, 16, 124) including a housing (28), a light source (38) disposed within the housing, and a handle (36) carried by the housing, adapted for grasping for moving the housing to selected positions, the lighting system characterized by:

a bezel (50), the handle being at least partially spaced from the housing by the bezel; and

an actuator (60, 62, 64) on the bezel, for selectively adjusting an intensity of light emitted by the light source.

2. The lighting system of claim 1, further characterized by:

the actuator including at least one switch (74, 76) for selectively adjusting the intensity of light emitted by the light source in incremental amounts.

3. The lighting system of either one of preceding claims 1 and 2, further characterized by:

a controller (70) operatively coupled between the actuator and the light source and adapted to control the intensity of light emitted from the light source in response to actuation of the actuator.

4. The lighting system of claim 3, further characterized by:

the controller being adapted to modify the intensity of light emitted from the light source in response to successive actuations of the actuator in predefined increments of light intensity.

5. The lighting system of either one of preceding claims 3 and 4, further characterized by:

the actuator including:

a first switch (74), actuation of the first switch increasing the intensity of the light emitted from the light source a selected amount between lower and upper intensity levels; and

a second switch (76), actuation of the second switch decreasing the intensity of the light emitted from the light source by a selected amount between upper and lower intensity levels.

6. The lighting system of claim 5, further characterized by:

the controller switching off the light source in response to a prolonged actuation of the second switch when the intensity of the light is at the lower intensity level.

7. The lighting system of either one of claims 5 and 6, further characterized by:

the controller applying power to an ambient lighting device (80), spaced from the lighthead, in response to a prolonged actuation of the second switch when the intensity of the light is at the lower intensity level.

8. The lighting system of claim 6, further characterized by:

the controller applying power to the ambient lighting device in response to the prolonged actuation of the second switch substantially simultaneously with switching off the light source.

9. The lighting system of any one of preceding claims 5-8, further characterized by:

the actuator further including:

a third switch (82), actuation of the third switch turning the light source off when the light source is on, actuation of the third switch turning the light source on when the light source is off.

10. The lighting system of any one of preceding claims 1-9, further characterized by:

the handle being rotatable relative to at least one of the bezel and the housing.

11. The lighting system of any one of preceding claims 1-10, further characterized by:

the handle being removable from the lighthead without disconnecting electrical connections between the actuator and the light source.

12. The lighting system of claim 2, further characterized by:

a second lighthead (16) including a second housing;

a second light source disposed within the second lighthead housing, and wherein:

the controller (70) is electrically coupled to the second light source and is adapted to control an intensity of light emitted from the second light source in response to selected activation of the actuator.

13. The lighting system of claim 12, further characterized by:

the second lighthead including a second actuator, operatively connected with the second light source by a second controller, for adjusting an intensity of light emitted by the second light source, each of the first and second actuators being operable to switch off the light source of the lighthead associated with the other of the first and second actuators.

14. The lighting system of either one of preceding claims 12 and 13, further characterized by:

the first and second lightheads being each mounted to a common support **(18)** by an articulated arm **(20, 22)**.

15. The lighting system of any one of preceding claims 1-14, further characterized by:

the actuator including at least one switch **86, 88** for controlling operation of at least one of the group consisting of video equipment **(126)** and audio equipment.

16. The lighting system of claim 1, further characterized by:

a sterile cover **(54)** selectively mountable on the handle and bezel such that the cover covers the actuator, the actuator being operable through the cover.

17. The lighting system of any one of preceding claims 1-16, further characterized by:

a gearbox for focusing the light from the light source, the gearbox being mounted to the housing;

a handle subassembly mounted to the gearbox, rotation of the handle being conveyed to the gearbox by the handle subassembly, the handle subassembly extending through an opening in the bezel, the handle being removably mounted to the handle subassembly.

18. The lighting system of claim 17, further characterized by:

the lighthead housing including a reflector **(40)** and a lens system **(32)**, rotation of the handle causing the gearbox to adjust the position of one lens of the lens system relative to another lens of the lens system, thereby adjusting the focus.

19. The lighting system of any one of preceding claims 1-18, further characterized by:

the controller **(70)** being operatively coupled between the actuator and the light source and controlling the intensity of the light source in response to an actuation of the actuator.

20. A method of adjusting illumination from a lighthead **(14, 16, 124)**, the method comprising covering a handle **(36)** of the lighthead with a sterile cover **(54)** and manipulating the handle to adjust a pattern size of illuminated light from a housing **(28)** of the lighthead on a subject, the method characterized by:

manipulating an actuator **(60)** through the sterile cover to adjust an intensity of the illuminated light, the actuator being spaced from the handle.

21. The method of claim 20, further characterized by:

the actuator being positioned intermediate the housing and the handle such that the handle is removable from the housing without removing the actuator, the method further including, prior to the step of covering the handle:

sterilizing the handle; and

mounting the handle on the lighthead.

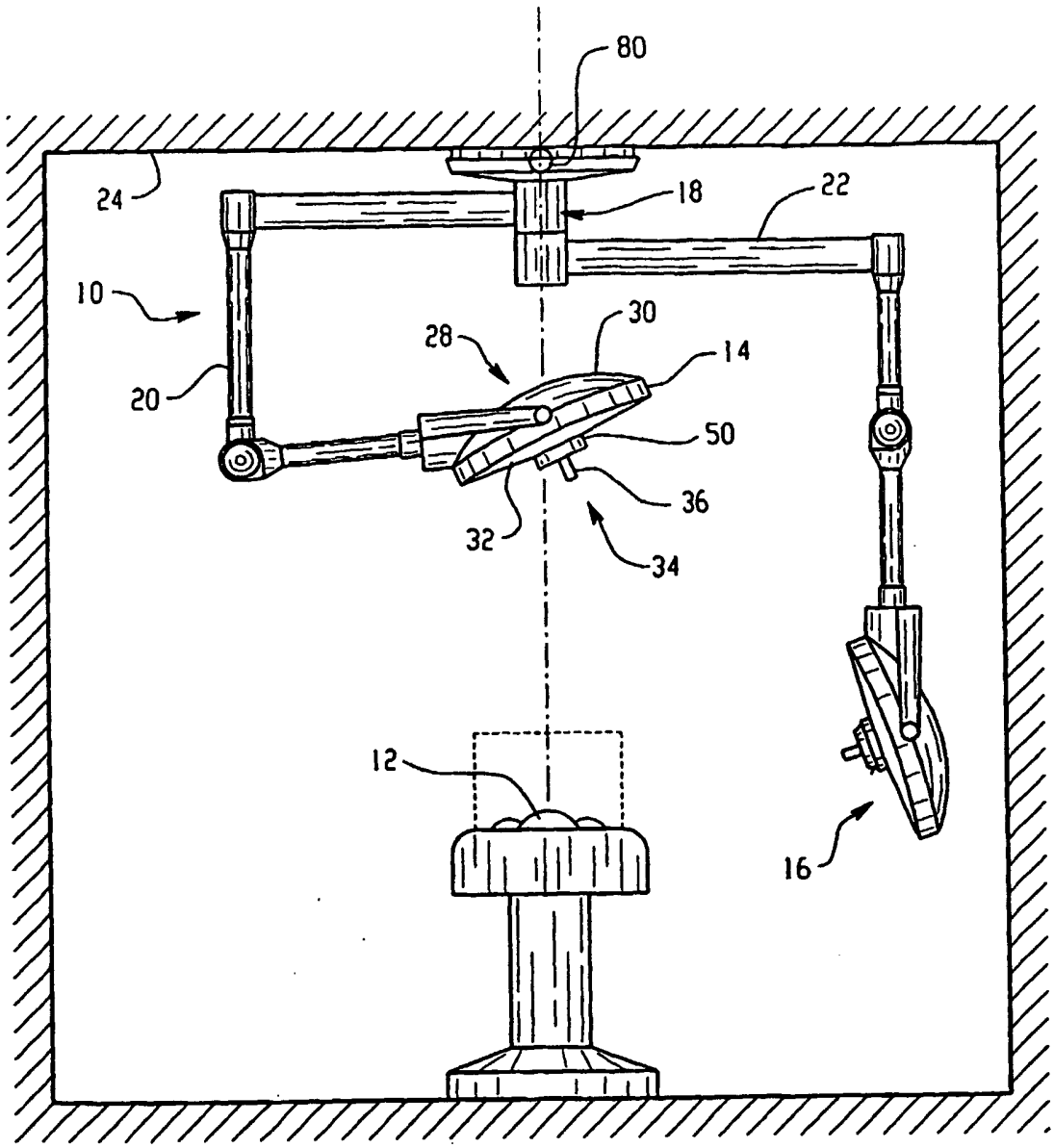

Fig. 1

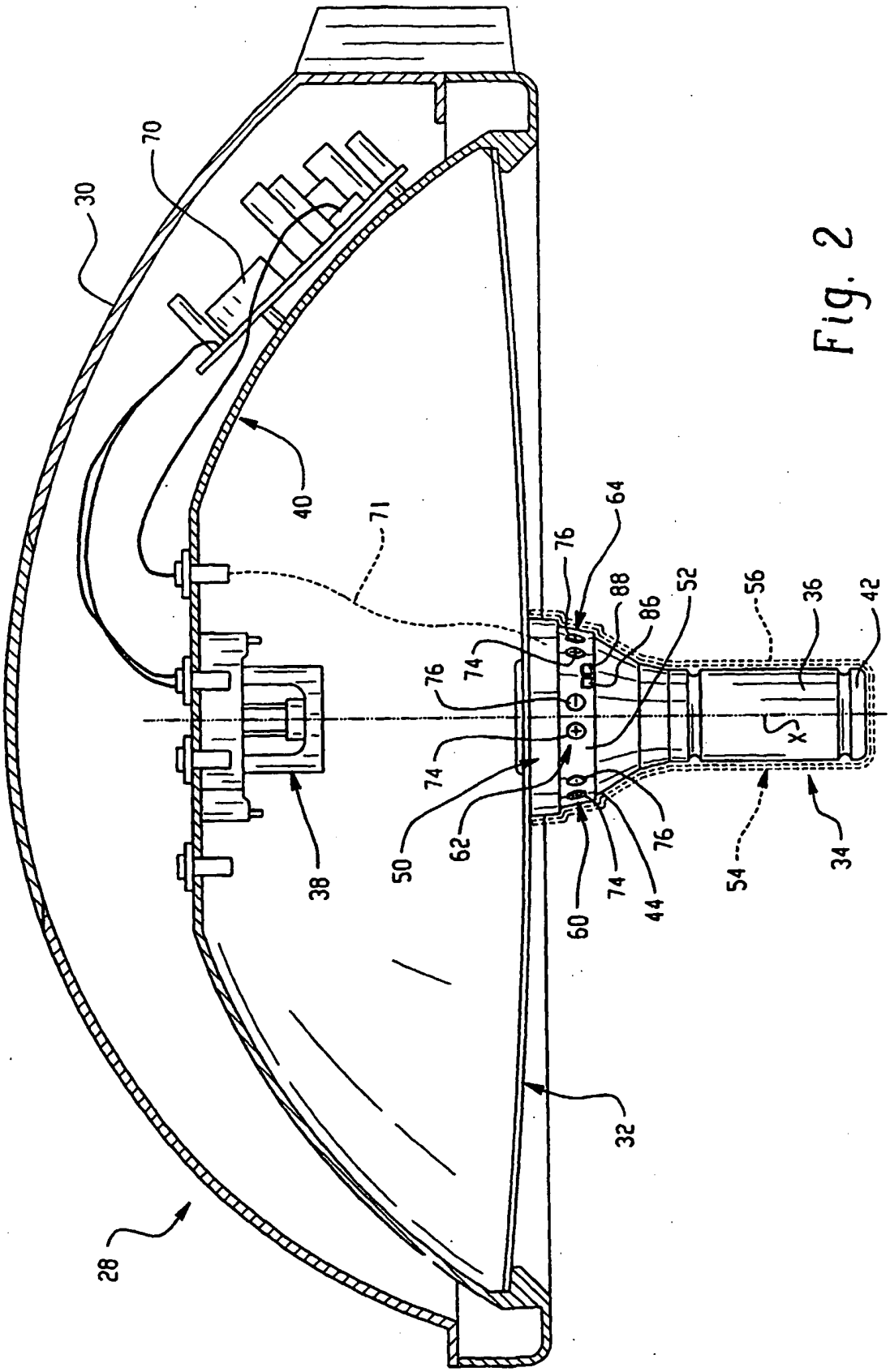

Fig. 2

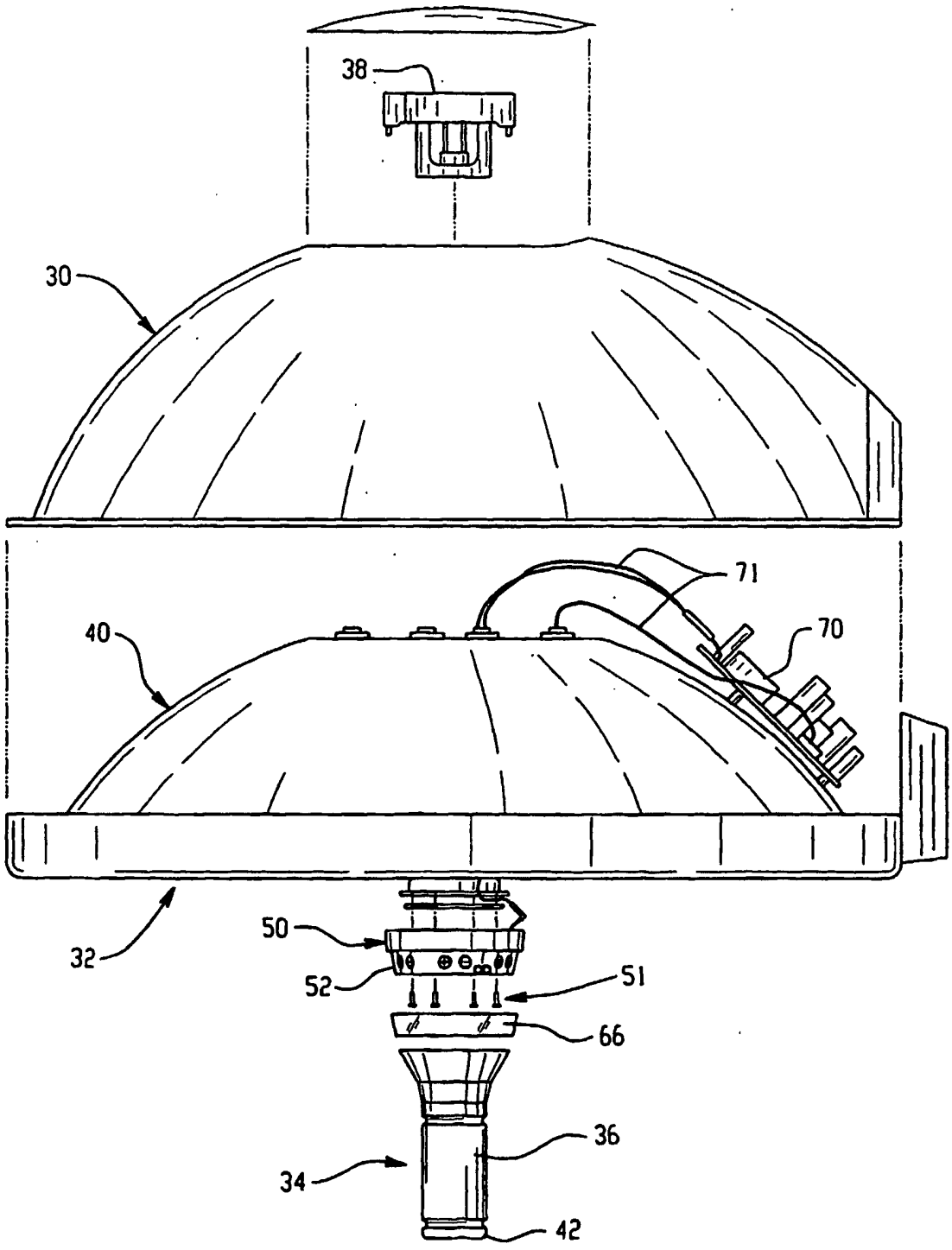

Fig. 3

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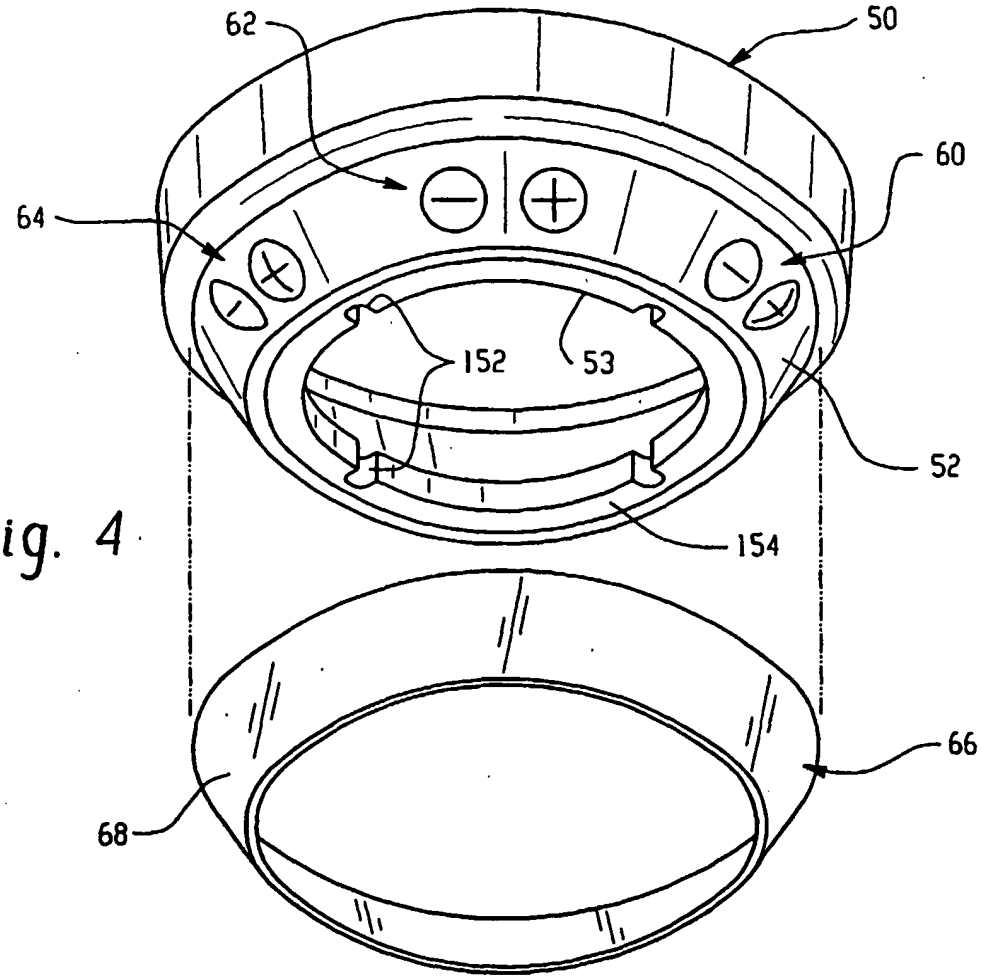

Fig. 4

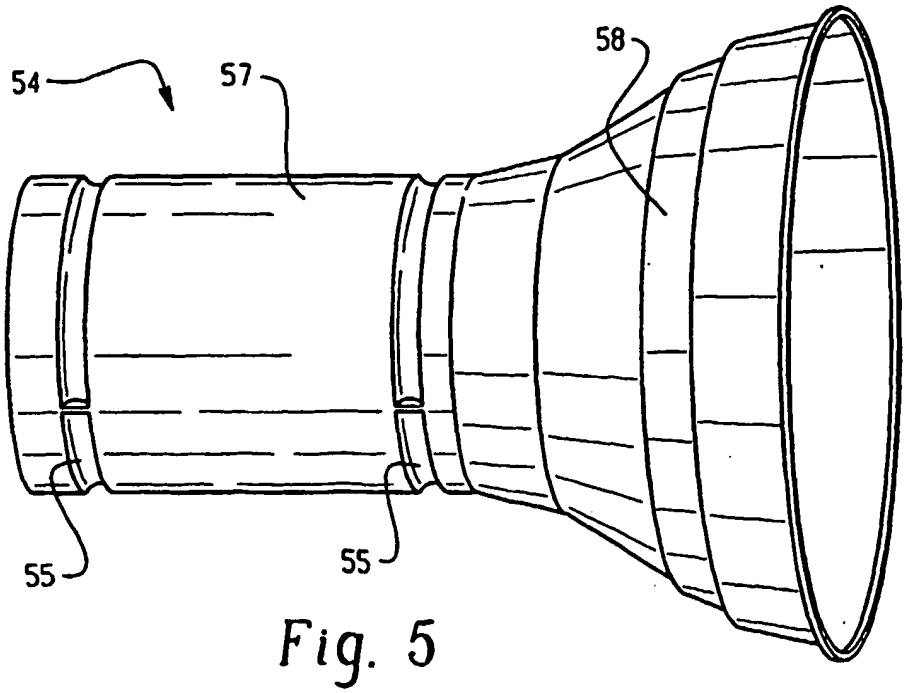

Fig. 5

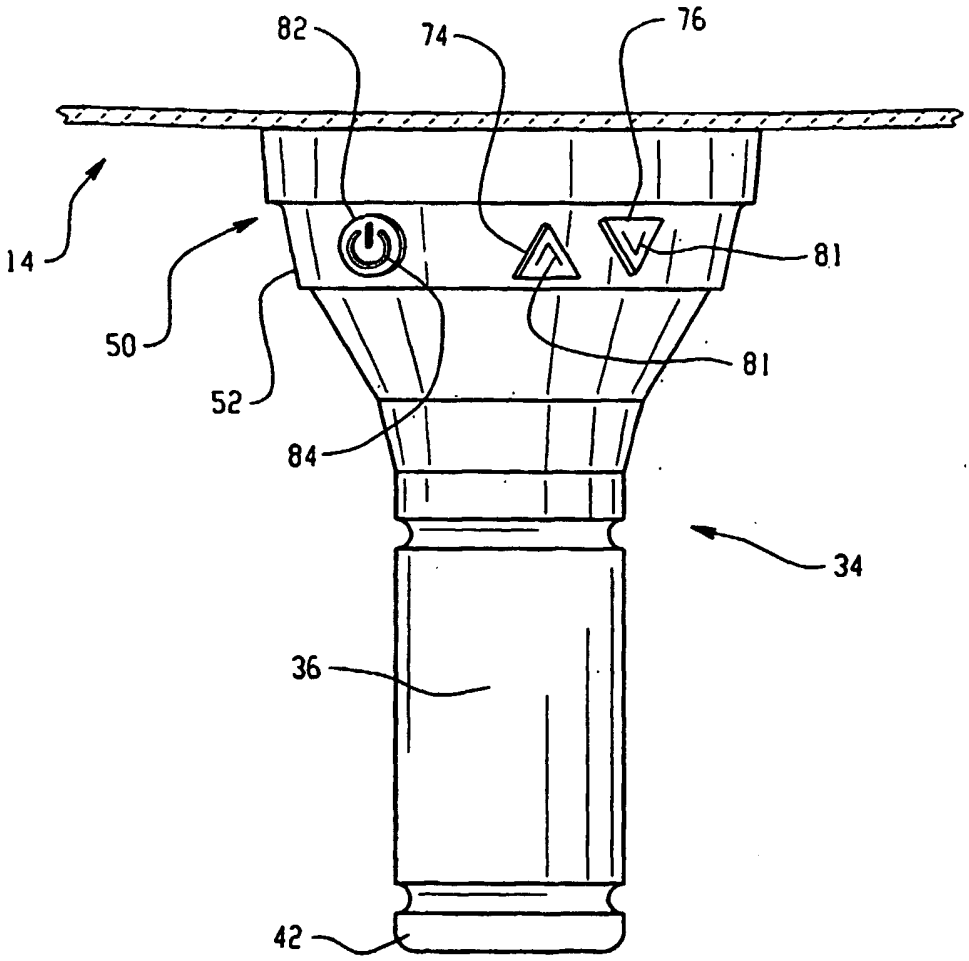

Fig. 6

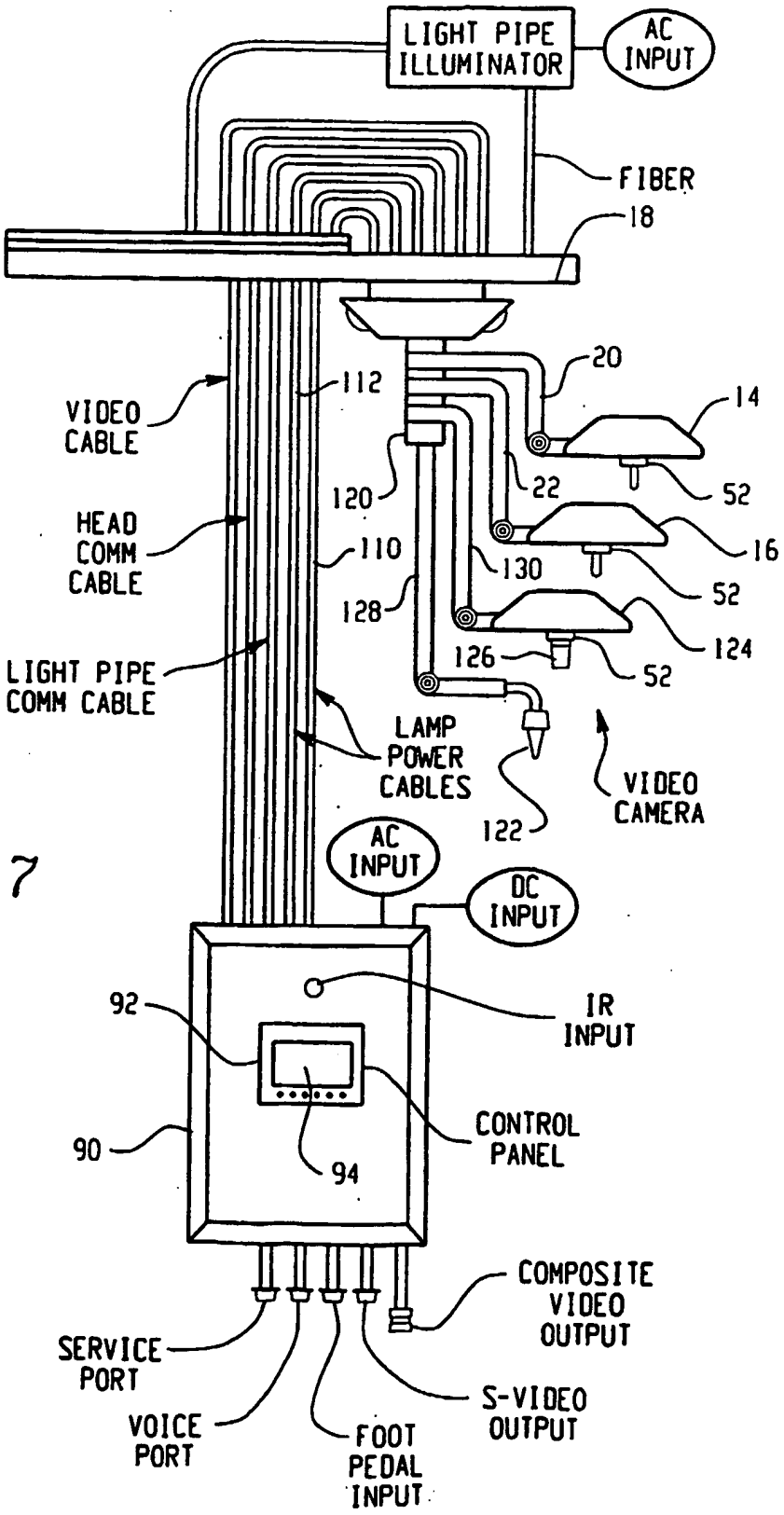

Fig. 7

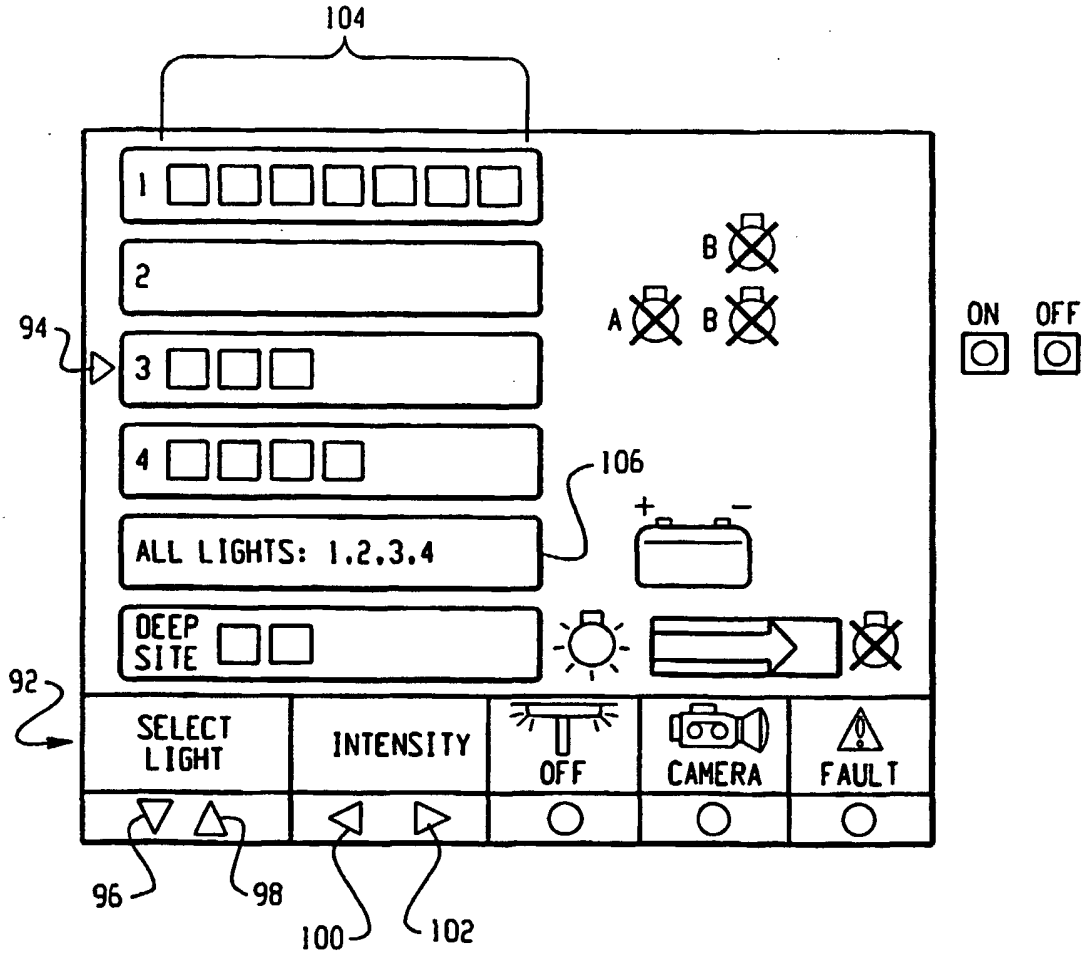

Fig. 8

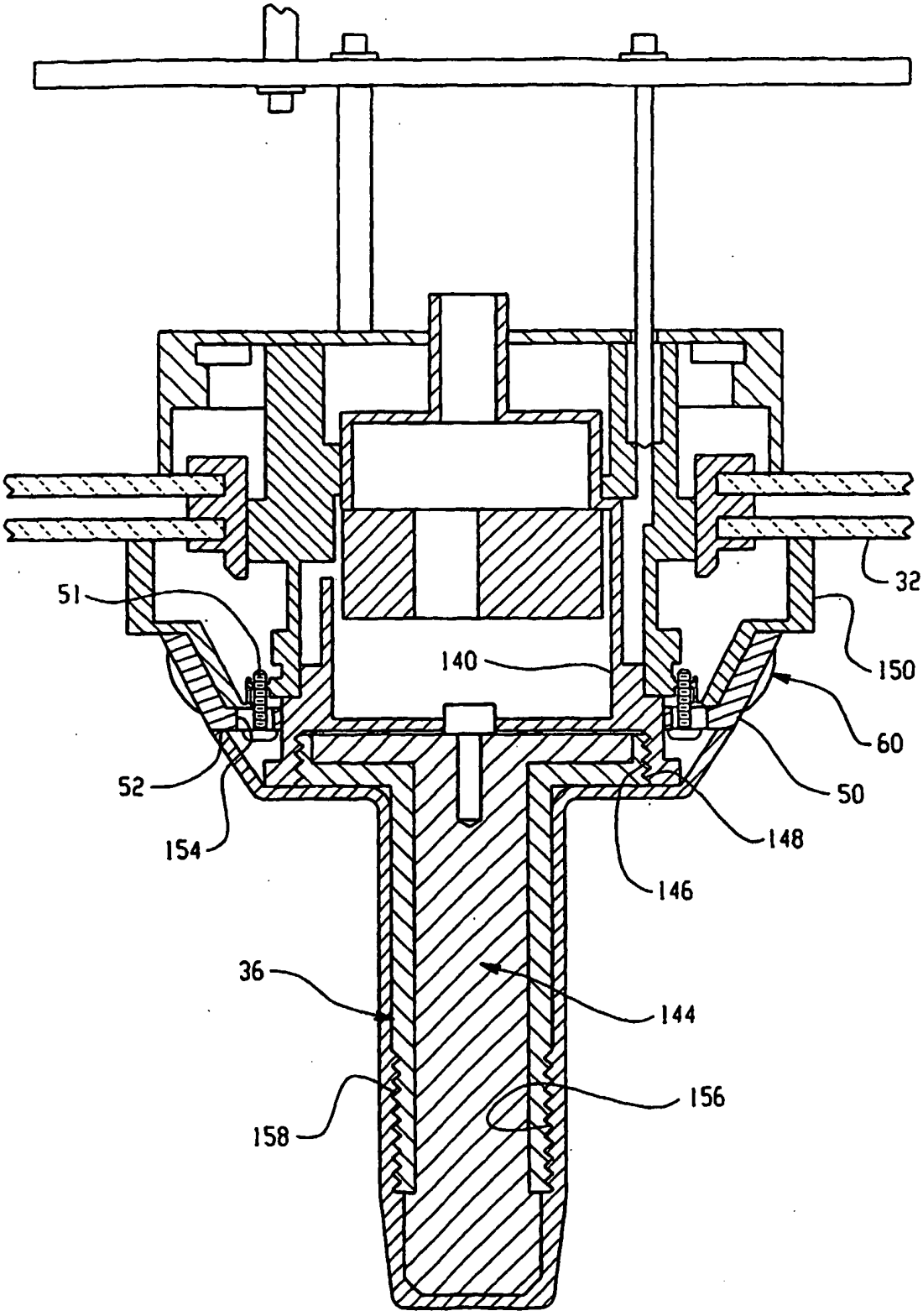

Fig. 9

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F21S8/00 F21V21/40

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 F21S F21V A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 819 836 A (EMMANUEL QUETIN) 9 September 1959 (1959-09-09)	1,2
Y		3-12, 14-21
	the whole document	

Y	WO 99 50593 A (HILL ROM CO INC) 7 October 1999 (1999-10-07)	3-10,12, 14,16-21
A		1,2
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Y	GB 739 621 A (GILBERT FRANCOIS MARIUS GROBEL) 2 November 1955 (1955-11-02) page 2, line 84 - line 87 figure 1	11
A		1

	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
1 July 2003	08/07/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Cosnard, D

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	EP 0 280 839 A (BOWSKILL MARY J ;MCDONALD NORMAN V (US)) 7 September 1988 (1988-09-07) column 5, line 4 - line 31	16
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A	figure 1	1

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